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# PROPOSED TEST AND EVALUATION PLAN FOR THE FAIRCHILD CHIP FORMAT PRINTER

#### PREFACE

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is propared to insume that all aspects of the manufacturer's contract specifications are met. This shall be achieved by rigid testing of the equipment.

Every operational test possible shall be accomplished on the item of equipment. Those procedures considered necessary for such testing are outlined in this test and evaluation plan. There is allowance for test flexibility in this proposed plan to insure the utmost comprehensive testing possible.

Proposed	Test	and	Eva	aluation	n Plan	for	the
		CF	IIP	FORMAT	PRINT	ER	

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The ATP and the Installation and Maintenance Manuals for this printer are quite complete insofar as tests are dictated for all major functions and subsystems. To evaluate an apparatus implies that the operative characteristics of that piece of equipment are being determined and compared to general specifications or standards of that piece of equipment. If no specifications or standards exist because the equipment is a prototype, then practical limits must be applied and the performance of the printer compared to available operational guidelines. If no complete basis exists for evaluation, then only a reporting of the results obtained is possible. The basic evaluation philosophy is a rational, unbiased, and objective equipment evaluating procedure.

Due to the inability of the Chip Printer to perform as expected, all repeatability problems will be processed using Data Corporation equipment. This equipment is sensitometrically controlled within better than acceptable limits.

There are two repeatability problems that must be examined:

(1) the exposure repeatability and (2) the mensuration and locational repeatability. Sources of error in the first may be either timing errors, light fluctuations or both. Errors in the mensurational ability may be due to the operator, improper readin of the input data (generally detectable by parity error), logic error, or errors in the servo system. Also, it is known that varying film base thickness in the imagery will contribute to the errors, as the machine was designed for 5.6-mil base film.

Illumination uniformity will be evaluated photographically on a comparison basis, with a uniformly exposed standard processed simultaneously with a sample from the Chip Printer. This uniformity test will be run using the same emulsion exposed on the Eastman Kodak Type IB Sensitometer at the same spectrum level

as the printer in order that fluctuations will be easily plotted.

Resolution measurements will be performed using materials and resolution targets with capabilities greater than that of the system, thereby determining the limiting resolution capabilities of the printer. Sufficient sampling of the drive and mensuration counting equipment will be accomplished to allow the statement of limits with respect to any set of mensuration parameters.

In evaluating the locational drive system, the matter of timing will be considered. Areas of interest and scribed predetermined points will be placed through a five-inch roll of 4-mil Estar exposed film. The time will be determined as well as the average chip production rate. This information will aid in determining the workload that can be placed on the machine.

The exposure repeatability is primarily a standard variance determination problem which will be undertaken with various neutral density filters covering the object platen under various auxiliary exposure conditions that are available on the printer (± 3 stops and "normal"). If significant exposure variances are detected, then further scudies will be initiated to determine the source of the variability (light source, exposure time fluctuations, etc.).

It will be noted in the proposed testing of the printer, that little reference is made to the manuals supplied with the equipment. This is because these manuals provide primary installation, start-up and running instructions, and basic maintenance but little of the equipment's photographic behavior. In this evaluation we intend going beyond the manufacturer's standards and specifications to determine the capabilities of the printer.

CONTACT	CHIP	PRINTER
CONTACT	CHIP	PRINTER

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This contact chip printer should be capable of producing high-resolution photographic images on 4- by 5-inch cut film. Two image sizes are provided: 55 by 95mm and 80 by 95mm, offering the analyst an image size commensurate with scale and ground coverage insofar as can be accommodated. A human/machine-readable accession or reference number consisting of usable information as well as fiducial marks and security classification will be simultaneously printed on the output film chip. Input materials will be 70mm- to 9-1/2-inches-wide original negatives in a single roll. The printer will be paper-tape driven with manual override for all functions.

CHIP SAMPLE

	TWE OF THE CHIP FORMAT PRINTER	STAT
1.	Purpose	
	The purpose of the test program is to determine the specification this test plan. The printer must perform within test plan.	SIAI ns as out-
outlined	standards to be considered acceptable.	
2.	Responsibility	
ance test and other in other	It will be the responsibility of the Photo assigned, to supervise and run all phases of and to handle the procurement of test film support materials as required. Technical at than the photographic area will be provided nation with Electronic and Mechanical Engine	of the accept- , instruments, assistance , as required,
3.	Acceptance Test, Phase I	
the proce	The criteria set forth in this plan are in the minimum acceptable standards. Slight dedures is permitted in order to utilize mate lefficiently during certain phases.	eviation from
3.2	Documentation	
3.2.1 tests per	A written detailed history will be maintain rformed and results obtained.	ned of all
3.3	Quality Control	
-	Quality control will be exercised in all properties of contamination which st results during mechanical, electronic, and ting.	would de-
3.4	Chip Format Printer	
3.4.1	Exterior	

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or missing screws, proper fitting of components, hardware, acces-

Check exterior of machine for workmanship, i.e., loose

- sories. Check for any signs of damage (and probable cause).
- 3.4.1.2 The unit shall be examined visually for workmanship as evidenced by the neatness and thoroughness of marking of reference designations, plating, riveting, machine screw assemblage, soldering, and wiring in accordance with accepted standards.
- 3.4.1.3 Check that all knobs, mounts, hoses, lines, and rollers are in place and correct electrical wiring is connected.

#### 3.4.2 Installation

3.4.2.1 Check leveling to insure that machine and its auxiliary components and main frame are rigid and not subject to stress.

#### 3.4.3 Controls

3.4.3.1 Check the following controls for proper operation in sequence as outlined in operational manual, i.e., main power, drive, take-up, air, vacuum, etc. During this phase check indicator lamps and fuses.

#### 3.4.4 Air and Vacuum Units

3.4.4.1 Check air inlet for pressure at source and at indicator. Also check filtration of air to knives.

# 3.4.5 Air Squeegees, Air Bearings, and Vacuum

3.4.5.1 Check for evenness of flow and for proper operation and amount of control for air and vacuum.

# 3.4.6 Film Transport

- 3.4.6.1 Film, 70mm, 5 inches, and 9-1/2 inches wide, in lengths of 500 feet each, will be run through machine with and without liquid gate in operational mode. This phase has no connection with the sensitometric evaluation.
- 3.4.6.2 Check for proper alignment and transport through all components from raw-stock magazine through take-up cassete and note discrepancies.
- 3.4.6.3 Check for any erratic movement of the film during transport and at the liquid gate in conjunction with the take-up roller assemblies.

- 3.5 Electrical and Electronic Components
- 3.5.1 Check all electrical mechanisms for operation.
- 3.5.1.2 Check electrical wiring for coding.
- 3.5.1.3 Check all electrical connections and components for secure mounting. Check ease of replacement of components, such as pumps, relays, etc., that experience has shown will require periodic replacement during normal use.
- 3.5.1.4 Check all electric mechanisms for proper operation, i.e., motors, indicator light switches, teletype, and peripheral equipment.
- 3.6 Mechanical Components
- 3.6.1 This phase depends on prior component testing. Check for secure mountings and connections prior to actual test run.
- 3.7 Quality Checks
- 3.7.1 Material utilized in testing will be closely checked for the following defects (exclusive of sensitometric testing):
  - a. Scratches
  - b. Folding due to tracking
  - c. Abrasions
  - d. Torn or ripped edges
  - e. Sediment in liquid gate and filters.
- 3.7.1.1 Overall ability to maintain quality.
- 3.7.2 Printing
- 3.7.2.1 The following films shall be tested during the tracking phase:
  - a. 9.5-inch width, thin base and heavy base (maximum 500-foot lengths).
  - b. 5-inch width, thin base and heavy base (maximum 500-foot lengths).
  - c. 70mm width, thin base and heavy base (maximum 500-foot lengths).

(NOTE: Machine is designed to accept 5.6-mil base film.)

- 4. Acceptance Test and Evaluation Report
- 4.1 Mechanical Test Phase
- 4.1.1 Consolidation of all results listed in 3. above.
- 4.2 Sensitometric Test Phase
- 4.2.1 Consolidation of all results listed in sensitometric test.
- 4.3.3 Graphs, charts, photographs and other materials will be used wherever possible to illustrate results.
- 4.4 The following format will be used for this report:
  - a. Abstract
  - b. Purpose
  - c. Test Procedures
  - d. Test Results
  - e. Conclusions
  - f. Recommendations
  - g. Appendices othis should include all materials in 4.3 above required to support the conclusions.)
  - h. Copy of the test plan.

#### 5.0 Acceptance Test and Test Procedure Outline

A rather extensive installation and initial test program has been supplied by the manufacturer. This procedure will be followed in the initial starting and testing of the machine. Following this, a repeatability evaluation phase will be initiated utilizing 5-inch and 9.5-inch film.

The uniformity tests will consist of not less than 200 chips of SO-250 film material run per day for two days. Throughout the length of the test rolls, 790-L/mm bar targets, scribed targets, and continuous tone material will be exposed. Density measurements will be made on the processed material to determine the latitudinal processing uniformity, the inter-chip repeatability,

the intra-chip repeatability, and the day-to-day repeatability. The repeatability measurements will be stated as processing variances, associated with which will be a probability of conformance statement.

Also, at the time of the running of this series of tests, feasibility, capability, and quality of the liquid gate performance will be evaluated using upper only, lower only, and both upper and lower flooding of the gate. Fart of this phase of the test will be a refractive index check for matching with Estar film base.

Following the repeatability determinations, the conformance to the sensitometric standards will be tested. The sensitometric results are those taken to be the film manufacturer's standards for SO-250 (2430 Eastman Kodak film coated on 7-mil base), but the manufacturer's standards will not necessarily be test standards due to the spectrum sensitivity of the emulsion. Also, the actual sensitometric curves will not be taken from the . Kodak manuals, as the curves presented therein are not representative of the specific emulsion batch being utilized. All film chip tests will be run with the same emulsion number. Curves. resulting from controlled processing, will be established at a gamma of 1.00 if considered feasible.

- 5.1 The 5-inch film should contain, on a cleared portion, at least one 80mm x 5-inch pair of scribed lines with a separation of from 0 to 22 inches and 0 to 5 inches in X and Y, respectively, and with an angular separation of from 0 to 360 degrees.
- 5.1.1 Target Film 5-inch

 $5.4 \pm 0.3$  mils thick 200 feet long

- 5.1.2 The 5-inch target film should contain at least one splice.
- 5.1.3 The 5-inch film should contain at least one group of three marks at a separation of 0, 15, and 50 feet  $\pm$  0.25 inch from each other.

- 5.1.4 The 9-inch film should contain aerial imagery with scribed cross lines with a separation of trom 0 to 22 inches and 0 to 5 inches in X and Y, respectively, and with an angular separation of from 0 to 350 degrees.
- 5.2 Target tapes in standard Chip Print format should be available that contain dimensions within  $\pm$  0.05mm corresponding to the premeasured cross lines.
- 5.2.1 Target tapes will also be available containing all 44 data characters and all 10 security messages.
- 5.3 Resolution Targets 70 lines per millimeter, high contrast bar targets.
- 5.4 Film Chips Unexposed 4- x 5-inch film chips 50-250.
- 5.5 Gate Liquid 85% Freon 113, 15% tetrachloroethylene, as specified by contractor. Refractive indices will be tested to establish if they correlate with the indices of film base used.
- 5.6 The following indicator lights should be illuminated:

NORMAL OF

EXPOSURE CONTROL

AUTO of PRINTS REQ'D

AUTO of AEC VIEW

NO GO of GO/NO GO

LOWER LEFT CONTROL PANEL

END Of FILM
MAN Of X-Y-AZ

UPPER RIGHT CONTROL PANEL LOWER RIGHT CONTROL PANEL

5.6.1 Either half of the following manually operated split screen indicators or switches may be illuminated:

MANUAL FAST/SLOW
MANUAL SELECT - K-Y-AZ
FILM DRIVE CHANNEL - UPPER/LOWER
AZ POSITION - ZERO/LOAD
LOWER LEFT
CONTROL
PANEL

5.6.2 The following maltunction indicators or switches should be illuminated:

CHIP CASS EMPTY
DATA MAST EMPTY
AIR
LIQUID EMPTY
VAC

UPPER LEFT CONTROL PANEL

5.6.3 The following indicators should be extinguished:

DEV MAG FULL PARITY ERROR VENT DATA LAMP FAIL

UPPER LEFT CONTROL PANEL

- 5.6.4 Malfunction Check
- 5.6.4.1 Chip Cass Empty Remove and load the chip cassette with a minimum of 25 chips (the CHIP CASS EMPTY indicator will light when there are from 0 to 25 chips, depending on chip thickness, left in the cassette). The CHIP CASS EMPTY indicator should then be extinguished.
- 5.6.4.2 <u>Data Master Empty</u> Install a roll of Cronapress in the Cronapress carriage. The <u>DATA MAST EMPTY</u> indicator should be extinguished.
- 5.6.4.3 Air Connect the air hose with a minimum of 60 psi to the CFP air connection. The AIR indicator should extinguish.
- 5.6.4.4 <u>Liquid Empty</u> Fill the Gate Liquid Dispensing Tank with gate liquid. The LIQUID EMPTY indicator should extinguish when there is more than 0.5 liter of liquid in the tank. Fill with approximately 20 liters.
- 5.6.4.5 <u>Vacuum</u> Turn the ON-OFF switch on the vacuum pump (mounted in the rear of the Electronic Cabinet) to the ON position. The VAC indicator should extinguish after a short period of time.

5.6.4.6 Magazine Position and Mask Size - The 80mm section of the MASK SIZE and MAG POS indicator should be illuminated green. Move the Print Magazine to the 55mm position. The 55 section of the MAG POS indicator and the 80 section of the MASK SIZE should illuminate red. Fash the Print Magazine to the rearmost position and remove the 80mm mask and install the 55mm mask. Move the Print Magazine to the 30mm position. The 80 section of the MAG POS and the 55 section of the MASK SIZE should illuminate red. Move the Print magazine to the 55mm section. The 55 section of MASK SIZE and MAG POS should be illuminated green.

#### 5.6.5 Manual Controls

- 5.6.5.1 Azimuth For this check, the STBY/ON switch shall be in the ON state. On the Lower Right Control Panel, place the MANUAL SELECT switch in AZ and the MANUAL switch in FAST by actuating the respective switches. Turn the AZIMUTH control CW and depress the OPERATION SWITCH. The Azimuth Unit in the Print Console should move CW at a velocity proportional to the displace. Ment of the AZIMUTH control. Actuate the MANUAL switch. The SLOW half of the indicator should light. The Azimuth Unit in the Print Console should continue to move at a reduced velocity, proportional to the AZIMUTH control displacement.
- 5.6.5.2 Azimuth Position Rotate the azimuth unit CCW until the AZ POSITION-ZERO indicator lights. The azimuth unit is now in the zero position. Rotate Azimuth CW approximately 270°. The AZ POSITION-ZERO light should go out and the LOAD light should come on. The supply film spool should be visible at the front of the Print Console. Rotate Azimuth CCW 180°. The LOAD light should extinguish and relight when the take-up spool is at the front of the Print Console. Continue rotating Azimuth CCW. The Azimuth Unit should have traversed a minimum of 360° by the time it hits the CCW STOP. Rotate Azimuth unit CW until the ZERO lights.
- 5.6.5.3 <u>Y Operation</u> Load a roll of 70mm film on the upper film drive and a roll of 5-inch film on the lower film drive.

Both films should have at least one splice to show splice handling capability. Return the Azimuth to the Zero position. Press the MANUAL SELECT switch to X-Y position. Set the MANUAL speed to FAST. Depress the OPEPATION SWITCH and simultaneously move the JOYSTICK forward. The Y carriage and the films should move in the forward direction at a speed proportional to the throw of the JOYSTICK. Return the JOYSTICK to the Center Position. The Y carriage should stop. Hove the JOYSTICK backward: the Y carriage should move backward and stop when the JOYSTICK is returned to the center position. Repeat the above with the MANUAL speed set to SLOW. The same results should apply, except that the speed should be glower.

- 5.6.5.4 X Operation Press the Film Channel Drive to UPPER position, and MANUAL speed to FAST. Depress the OPERATION SWITCH and simultaneously move the JOYSTICK to the right. The upper film drive should spool the 70mm film to the right in proportion to the throw of the JOYSTICK. Continue running the film to the right until the UPPER END OF FILM INDICATOR Ilights. Move the JOYSTICK to the left. The END OF FILM Should extinguish and the film should travel to the left. Continue running the film to the left until the UPPER END OF FILM indicator lights. Move the Joystick to the right until the END OF FILM poes out. Press the MANUAL speed to SLOW. Repeat the above. The same results should apply except that the speed will be slower. It is unnecessary to drive the film to the end of film limits.
- 5.6.5.5 Depress the FILM CHANNEL DRIVE to LOWER. Repeat the previous tests and the same results should apply to the 5-inch film on the Lower drive, including the end of film limits.
- 5.6.5.6 Film Footage Counter Load a roll of film on the lower film drive with premeasured 15-foot and 50-foot calibration. Set the FILM CHANNEL DRIVE to LOWER and reset the LOWER TRACK FILM FOOTAGE COUNTER to Zero. Drive the X Channel until the 15-foot calibration marker is reached. The LOWER TRACK FILM FOOTAGE COUNTER should read 15 ft.  $\pm$  0.4 ft. Continue driving the X

in the same direction until the 50-foot callbration is reached. The LOWER TRACK FILM TOOTAGE COUNTER should indicate 50 ft. within the tolerance of  $\pm$  0.4 ft.

Repeat the previous tests with calibrated film loaded on the upper drive. All readings should now apply to the UPPER TRACK FILM FOOTAGE COUNTER.

#### 5.7 Functional Tests

- 5.7.1 Liquid Gate The liquid gate shall be used in conjunction with the tests described in above paragraphs except that the liquid gate shall not be used when a tape splice is in or adjacent to the gate area.
- 5.7.1.1 Positioning Accuracy Lower Channel Load a roll of 5-inch + 0.3-mil film, with the appropriate premeasured cross lines scribed on it. Position the film so that the reference cross lines or film fiducials line up with the fiducial markers on the 80mm mask. Load a perforated tape on the tape reader having the X, Y and Azimuth information corresponding to the particular set of cross hairs to be checked. Set the following switches thusly:

FILM CHANNEL DRIVE - LOWER
X - Y - AZ - AUTO

Mensuration Counters X, Y and AZ - RESET ZERO

Press LOGIC RESET. Press TAPE READIN. The tape reader should start operation. After the tape reader stops, the servos should automatically start to position the film. When X has servoed and come to rest, the SERVO COMPLETE indicator should light. The unit should now be ready for making prints, i.e., the Chip Cassette should be loaded with SO-250 the Development Magazine should be in place, and Chip Holder should be loaded. The Print Required counter should read 6. Before making prints, ensure that the liquid gate is not operating. Press the PRINT button. When all prints have been made, they should be processed and then carefully measured. The distance from the center of the target cross lines to the center of the format, as determined by the mask fiducials, should be measured. This distance shall be designated E..

$$\mathbf{E}_{r} \max = \sqrt{\mathbf{E}_{x_{max}}^{2} + \mathbf{E}_{y_{max}}^{2}}$$

$$\mathbf{E}_{r} \max = \sqrt{(.3\text{mm})^{2} + (.2\text{mm})^{2}}$$

$$\mathbf{E}_{r} \max = 0.36\text{mm}$$

Where  $E_{x,max}$  and  $E_{x,max}$  are the maximum X and Y errors, respectively. The Azimuth error shall be measured between the target cross lines and the mask fiducials. The Azimuth error shall be 0.2 degree max.

- 5.7.1.2 Positioning Accuracy Upper Channel Repeat 5.7.1.1 with 5-inch, 5.4 ± .3 mil film on the upper film drive.
- Mensuration Counters Lower Channel Load a roll of 9-inch, 5.4 + 0.3 mil film with the appropriate premeasured cross lines scribed on it. Position the film so that the reference cross lines or film fiducials line up with the fiducial markers on the 80mm mask. ZERO RESET the MENSURATION COUNTERS (X, Y, and AZ). Now position the film manually in X, Y, and Azimuth so that the target crosslines coincide with the mask fiducials. The X MENSURATION COUNTER should now read the premeasured X value + 0.5mm. The Y MENSURATION COUNTER should now read the premeasured Y value + 0.5mm. The AZ MENSURATION COUNTER should now read the premeasured Azimuth value + 0.5 degree.
- 5.7.2.1 Mensuration Counters Upper Channel Repeat 5.7.2 with 5-inch, 5.4 + 0.3 mil film on upper film drive.
- 5.7.3 <u>AUTOMATIC CHIP COUNTER AND CHARACTER GENERATOR</u> A perforated tape shall be prepared and installed on the tape reader coontaining the numerals 0 through 9 and the letters A through Z +, -, 1, space, plus the additional machine readable symbols, Start of Message, End of Transmission, End of Address, DC4 Stop Code.

These characters will be arranged in sequence except for the section that contains the Print Quantity information. The Print Quantity should call for 18 prints. Sufficient raw

SO-250 and chip holders should be loaded into the machine. tape reader is started by depressing TALF READIN button. After the tape readin is completed, 18 should appear on the PRINTS RE-QUIRED COUNTER. When SERVO COMPLETE lights, the print cycle is started by pressing the PRINT button. After exposing 18 chips, the machine should stop and the PRINTS PRINTED indicator should read "18". The number of chips in the processing magazine should be counted. There should be 18 chips. Two chips should be removed from the processing magazine for developing. After proper processing they should be examined for legibility of the character generation. All alphanumerics should be present and readily legible. The machine readables should be in a straight line array, both vertically and horizontally. Each bit should have its edges clear and sharp with the contour varying from its mean edge by no more than 0.010 inch max. The maximum deviation of any bit mean edge should be less than 0,005 inches from the mean edge of all the bits.

During the above, the Security classification should also be printed on the output. Check for clarity.

5.7.4 Parity Error (Vertical) - Insert a perforated tape that contains an intentional vertical parity error. Press LOGIC RESET and TAPE READIN. When the tape reader comes to the parity error, it should stop and the PARITY ERROR - VERTICAL indicator should light. The SERVO COMPLETE indicator should not light nor should the servos move.

(Longitudinal) - Insert a punch tape that contains an intentional longitudinal parity error. Press LOGIC RESET and TAPE READIN. When the tape reader comes to the parity error (this is the last used information in the tape), it should stop and the PARITY ERROR - LONGITUDINAL indicator should light.

5.7.5 <u>Automatic Exposure Control System</u> - The Automatic Exposure System utilized in this printer consists of 3 separate parts.

- (a) The basic automatic system where the densities of the central area are sampled and integrated.
- (b) An auxiliary viewer and exposure control sensor where a 1/4-inch diameter in the center of the format is sampled, and the resultant light intensities then determine the relative exposure for that area.
- (c) Seven auxiliary buttons which may be used in conjunction with either system (a) or (b) above.

The seven buttons are set with the middle one on Normal (N) and each button on the right being (plus) (+) 1 stop from the next and each on the left being (minus) (-) 1 stop from the next for a total range of 7 stops.

To check the above system, input film consisting of three clear densities, should be prepared. It is not important what these densities are, provided they are known. An attempt should be made to cover a range equivalent to the average densities of expected inputs. Therefore, aim for the following approximate densities:

- (a) 0.3
- (b) 0.9
- (c) 1.5

5.7.5.1 Normal View - Load the input film, prepared as above, or a neutral density filter into the Chip Printer. Set PRINTS REQ. to MAN. and NO PRINTS MAN to 2. Press the PRINT button. When printing stops, remove the 2 chips from the processing magazine for development and examination of print density. Repeat the above with all 3 densities. The output density shall be Neutral Density (ND)  $0.7 \pm 0.2$ , excluding normal development tolerance.

- 5.7.5.2 Auxiliary Exposure Control Repeat the above test utilizing the small screen viewer and exposure control. Both of these tests are to be done with the select buttons on Normal.
- 5.7.5.3 Select Buttons Insert a step wedge in the film gate and manually adjust the exposure time by removing relay 1A3 A5 K1 and positioning the AEC servo so that a step in the center of the wedge is reproduced on a chip as a density of approximately ND 1 with the normal select button depressed.

Press +1 select button and PRINT. The step that is ND 0.3 denser than the reference step shall reproduce as the approximate ND 0.7  $\pm$  0.2. Repeat by pressing each of the buttons in turn, each button giving ND 0.3  $\pm$  0.2 variation from the next.

- 5.7.5.4 Evenness of Illumination Adjust the AEC and/or insert ND filters in the film gate to achieve an output chip density of ND 0.1 to ND0.3. Examine this chip for evenness of illumination. Illumination variation should be  $\pm$  20% maximum.
- 5.7.6 Resolution Note: Resolution target and pattern will be Data Corporation 790 L/mm bar targets or equal.

Install a resolution target in the format area. The target should be of high contrast and at least cover the range out to 400 lines per millimeter. Set PRINTS REQUIRED to MAN and NO. PRINTS MAN dial to 2. Load the Chip Cassette with type SO-250 film. Press the PRINT button. After processing, the chips should be examined. The resultant resolution should be within a minimum of 12 percent or one target down from the manufacturer's rated resolution, which for film SO-250 developed in D-76 is 335 lines per millimeter.

Note: Because of the extremely small area being utilized by the resolution target, it may be necessary to disengage the automatic exposure control to give a proper exposure. Resolution should only be checked with proper exposure.

5.7.7 <u>Security Classification</u> - In all of the preceding tests using perforated tapes, a message was printed onto the output chip in the Security classification block. Each different test used a different message. Samples from each test should be examined for

legibility of all 10 security class messages.

5.7.8 Final Plotographic Check - A final test should be performed to show complete operation. A 500-foot roll of 9-inch, 5.4 ± 0.3 mil, film containing imaged aerial photography should be acquired. The principal point should be determined by utilization of the fiducials. Actual dimensions from 2 selected points of interest should be determined, and a run of 10 chips at each point should be made.

A corresponding tape input should be made to conform with the above dimensions. A full line of alphanumeric and corresponding digital data should be placed on the input tape. The Input Tape should call out a definite Security classification.

The selected film should then be placed in the chip format printer. The film should be aligned to the principal point. The machine should now be placed in automatic mode, and the tape read in. Ten prints should be made of each point selected.

The time to print 10 prints should be measured from the time print button is depressed until 10 chaps have been placed in the processing magazine. This time, by specification, should be a maximum of 100 seconds with a design objective of 60 seconds.

After printing has stopped, the chips are processed. One chip of each run should be examined for:

- (a) Accuracy of point printed
- (b) Security classification
- (c) Digital data
- (d) Alphanumerical readin
- (e) Print quality

## 5.8 Commercial Equipment To Be Used in Test Program -

Densitometer - Macbeth or equivalent Mann-Data Micro-Analyzer Microscope Comparator

#### 5.8.1 Developing Aggipment -

Precision processing controlled Mastman Kodak Versamat with chemistry to be established by test to eliminate mottling with type 50-250 emulsion.

#### 5.8.2 Test Equipment -

Special Equipment

Target Films

Target Film 70mm

5.4 + 0.3 mils thick

200 feet long

The 70mm target film should contain at least one splice.

Target Film 5- and 9-inch width

 $5.4 \pm 0.3$  mils thick

200 feet long

The 5- and 9-inch target film should contain at least one splice.

The 5- and 9-inch film should contain at least one group of three marks.

- 5.9 <u>Data Recording and Log Book</u> Actual test values of the unit under test shall be recorded even in the event of failure. A daily log book shall be kept with details of each day's testing.
- 5.10 Retesting In case of failure of the unit under test, the unit shall be retested to the requirements established after necessary adjustment and repair.
- 5.11 Test Equipment Substitutions It is permissible to substitute for any test equipment called out in Paragraph 5.8.2, provided that the substituted equipment is capable of performing the particular test or tests without modifying the results.

## 6.0 REQUIREMENTS

Mechanical Requirements - Prior to determining compliance with the performance requirements, the following mechanical

requirements should be mat.

<u>Dimensions</u> - The unit shall be checked to determine compliance with the dimensions shown in attached drawings and installation requirements.

Markings - Appropriate numeriates will be checked on all three major assemblies.

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